

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

REC'D 11 NOV 2004



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Applicant's or agent's file reference 6/WW32649WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/03833	International filing date (day/month/year) 03.09.2003	Priority date (day/month/year) 03.09.2002
International Patent Classification (IPC) or both national classification and IPC F16L55/1645		
Applicant PIPELINE POLYMERS LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 02.04.2004	Date of completion of this report 10.11.2004
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International application No. **PCT/GB 03/03833**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*

Description, Pages

1-20 as originally filed

Claims, Numbers

8-40, 41 (part) received on 22.04.2004 with letter of 19.04.2004
1-7, 41 (part), 42-51 filed with telefax on 27.08.2004

Drawings, Sheets

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
- (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-42,44,46-49
	No: Claims	43,45,50,51
Inventive step (IS)	Yes: Claims	
	No: Claims	1-51
Industrial applicability (IA)	Yes: Claims	1-51
	No: Claims	

2. Citations and explanations

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see separate sheet

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Re Item I

Basis of the report

Independent claim 1 is the combination of original claims 1 and 20 with additional features disclosed in the description, see, for instance, page 3, last two paragraphs. Independent claim 41 is the combination of original claims 42 and 43 with the additional features corresponding to those introduced in claim 1. The other claims are substantially unamended: merely minor clarity amendments were made.

Re Item IV

Lack of unity of invention

Independent apparatus claims 43 and 45 do not contain any technical features corresponding to the characterising features (special technical features) of independent method claim 1 and apparatus claim 41. Therefore, the requirements of unity of invention as set forth in Rule 13.2 PCT are not met by said claims and their dependent ones.

Moreover, independent claims 43 and 45 have not any corresponding technical feature in common among each others, either (Rule 13.2 PCT), since claim 43 appears to be characterised by "means for removing residue of said components from the channel..." whereas claim 45 claims particular "means for ejecting the components from the respective reservoirs simultaneously...".

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Document WO-A-01/38691 discloses a method of treating a pipe according to the preamble of independent claim 1 (see page 2, lines 34 - page 4, line 35). The characterising features solve the technical problem of an insufficient sealing degree of the treated pipe, particularly in case of ground movement which may cause pipe cracks or in case of metallic pipe which may corrode. The claimed solution is well known in the art, as it is, for example, described in the description of the present application on pages 1 and 2 with reference to figures 2 and 3. Hence, the skilled person confronted to the aforementioned technical problem to be solved would immediately consider the solution already common in the art as indicated in the present description and add to the method known from WO-A-

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01/38691 "the subsequent step of applying a lining material over the interior surface of the pipe and the filling material to form a continuous fluid-tight coating of the pipe". By doing so, he would arrive at the subject-matter according to claim 1 without the use of any inventive activities.

Therefore, the subject-matter of independent method claim 1 does not involve an inventive step according to Article 33(3) PCT.

2. An analogous objection is to be raised about the subject-matter of independent product claim 41 defining the corresponding apparatus for lining a pipe. Such a subject-matter does not fulfil the requirements of Article 33(3) PCT, either.
3. An apparatus for lining a pipe as defined by independent claim 43 is known from documents EP-A-0 909 783, as can be unambiguously derived from column 9, lines 22-54, and EP-A-1 154 194, see column 4, lines 11-29.

Therefore, the subject-matter of independent claim 43 is not novel pursuant to Article 33(2) PCT.

4. The subject-matter of independent claim 45 is already disclosed by document DE-A-199 48 288: from column 4, lines 28-38 and from column 5, lines 61-67 it is to be understood that the components are simultaneously ejected. Furthermore, from the whole content of documents EP-A-0 909 783 (see, particularly, column 10, lines 46-49) and EP-A-1 154 194 (see, particularly, column 8, lines 11-19) can be derived that said documents disclose a subject-matter falling within the scope of said claim 45: in said last two documents the components are ejected in the mixing chamber/nozzle.

Thus, independent claim 45 does not fulfil the requirements of Article 33(2) PCT.

5. Moreover, at least one of the above cited EP-A-1 154 194, EP-A-0 909 783 and DE-A-199 48 288 discloses also the subject-matter of the dependent claims 50 and 51.
Hence, the subject-matter of said claims 50 and 51 does not satisfy the criteria of novelty as required by Article 33(2) PCT.
6. The other depending claims relate to minor constructional features which, insofar

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as not directly disclosed in the documents cited in the search report (reference is made to said search report where the relevant passages of the pertinent documents are listed in relation to the claims concerned according to the original numbering), represent only obvious modifications thereof. Such features will be selected by a skilled person in accordance with circumstances because the advantages thereby achieved can be readily contemplated in advance. The combination of such features with any of claim to which they refer does not involve an inventive step in the sense of Article 33(3) PCT.

7. The industrial applicability of the claimed subject-matter is clearly given in the description pursuant to Article 33(4) PCT.
8. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the at least one of the above-mentioned documents (the one which is deemed to be the closest prior art for the claimed subject matter) is not mentioned in the description, nor is this at least one document identified therein.
9. The requirements of Rule 10.1(a) are not met by the subject-matter of claim 49 and by the correspondent passage in the description.

CLAIMS

1. A method of treating a pipe (1,3) having at least one gap or discontinuity (13,15) on the interior surface thereof, the method including the step of applying filling material (21) to the gap or discontinuity (13,15) so as to provide a generally smooth interior surface (22) of filling material that is substantially flush with the interior surface of the pipe at the region of the gap or discontinuity (13,15) and characterised by the subsequent step of applying a lining material (19,34) over the interior surface of the pipe and the filling material (21) to form a continuous fluid-tight coating of the pipe.
2. A method according to claim 1, wherein the pipe (1,3) comprises a plurality of coupled sections and wherein the gap or discontinuity (13,15) is formed at the region where respective adjacent sections are coupled.
3. A method according to claim 1, wherein the gap or discontinuity (13,15) is created by deterioration of the pipe over time, such as by cracking or corrosion.
4. A method according to claim 1, wherein the gap or discontinuity (15) is a redundant fluid passage.
5. A method according to claim 1 or 4, wherein the gap or discontinuity (15) is a protrusion from the interior surface of the pipe.
6. A method according to any one of the preceding claims, wherein the filling material (21) is applied such that it bridges across the gap or discontinuity (13,15) but does not completely fill the gap or discontinuity (13,15).
7. A method of forming a pipe (1,3), including coupling a plurality of pipe sections, and treating the pipe according to the method of any one of the preceding claims.

8. A method according to claim 7, wherein the pipe sections are coupled by a spigot and socket joint.
9. A method according to claim 7, wherein the pipe sections are coupled by a welded joint.
10. A method according to claim 7, wherein the pipe sections are coupled a bolted gland joint.
11. A method according to claim 7, 8, 9 or 10, wherein the pipe sections are coupled by any method that creates an internal discontinuity.
12. A method according to claim 7 or 8, wherein a fluid seal (7) is applied between the pipe sections.
13. A method according to claim 12, wherein the fluid seal (7) is applied prior to applying the filling material (21).
14. A method according to claim 12 or 13, wherein the fluid seal (7) is located further from the centre of the pipe than the filling material (21).
15. A method according to any one of the preceding claims, wherein the filling material (21) is applied by spraying the filling material (21) onto the interior surface of the pipe.
16. A method according to any one of the preceding claims, wherein the filling material (21) is applied to a pre-joined or welded area of two pipes where a coating of the welded area (95) is required to provide a continuous internal protective coating.

17. A method according to any one of the preceding claims, wherein the gap or discontinuity (13,15) is a gap or discontinuity in an internal coating (34) of the pipe, and wherein the filling material (21) is applied to the gap or discontinuity in the internal coating in order to provide a continuous internal coating.
18. A method according to any one of claims 1 to 14, wherein the filling material (21) is applied by forming a cavity (75) at the gap or discontinuity (13,17) and supplying filling material (21) to the cavity (75).
19. A method according to claim 18, wherein the cavity (75) is formed by an inflatable bladder (69) inflated within the pipe.
20. A method according to any one of claims 1 to 19, wherein the lining material (21) is applied by spraying.
21. A method according to any one of claims 1 to 20, wherein the lining material (21) forms a cross-linked molecular structure.
22. A method according to any one of claims 1 to 21, wherein the lining material (21) is a flexible polyurea.
23. A method according to claim 12, wherein the fluid seal (7) is applied prior to lining the pipeline.
24. A method according to claim 12, wherein the fluid seal (7) is applied after lining the pipeline.
25. A method according to any one of the preceding claims, wherein the filling material (21) is a liquid, two-part resin system which sets substantially within one minute of the two parts mixing.

26. A method according to claim 25, wherein the first part of the resin system comprises polyisocyanate, optionally blended with a non-reactive plasticiser.
27. A method according to claim 25 or 26, wherein the second part of the resin system comprises one or more polyamines, optionally blended with one or more polyhydric alcohols (polyols) and/or a non-reactive plasticiser.
28. A method according to any one of the preceding claims, wherein the filling material (21) comprises two components which set when combined, the method including combining the two components in a channel (38) from which the combined components pass to the gap or discontinuity (13,15), and further including removing residue of said components from said channel (38) after treating the gap or discontinuity with the filling material.
29. A method according to claim 28, wherein the residue is removed by a piston (43) moving in said channel (38).
30. A method according to claim 29, wherein the residue removed by the piston (43) completes the application of the filling material to the gap or discontinuity.
31. A method according to any one of the preceding claims, wherein the filling material (21) comprises a plurality of components, each stored in respective reservoirs (36,37,49,51), and wherein the components are ejected from said reservoirs simultaneously.
32. A method according to claim 31, wherein the components are ejected from said reservoirs by movement of a piston (57,59) in each of said reservoirs.

33. A method according to claim 32, wherein the respective pistons (57,59) in each reservoir (49,51) are coupled to one another and are moved by a common power source (53,55).
34. A method according to claim 33, wherein the common power source (53,55) comprises an air or hydraulic actuator coupled to each of said pistons (57,59).
35. A method according to claim 18 or 19, wherein gas trapped in said cavity (75) is released or compressed as said filler material (21) is applied to the gap or discontinuity.
36. A method according to claim 35, wherein the gas is released through port means (63) in said cavity (75).
37. A method according to claim 36, wherein the port means (63) allows the passage therethrough of gas but not liquid.
38. A method according to claim 37, wherein the port means (63) comprises a PTFE fabric membrane which allows air particles therethrough but not liquid particles.
39. A method according to claim 18, 19, 35, 36, 37 or 38, including using information obtained from a camera (67) in said cavity to locate the cavity with respect to the gap or discontinuity.
40. A method according to claim 39, wherein the camera (67) has a diameter of 12mm or less.
41. Apparatus for lining a pipe (1,3) having at least one gap or discontinuity (13,15) in the interior surface thereof, the apparatus including means for

applying filling material to the gap or discontinuity such that a generally smooth interior surface of filling material that is substantially flush with the interior surface of the pipe is formed at the region of the gap or discontinuity, and characterised by means for subsequently spraying a liner material (29,34) over a region (21) of the interior surface including the filling material to form a continuous fluid-tight coating of the pipe.

42. The apparatus according to claim 41, wherein the said applying means is operable to apply a low viscosity polymer.

43. Apparatus for lining a pipe (1,3) having at least one gap or discontinuity (13,15) therein, the apparatus including means for applying filling material (21) to the gap or discontinuity (13,15) so as to form a generally smooth interior surface of the pipe at the region of the gap or discontinuity (13,15), the applying means comprising a source of a first component of the filling material (36,49) and a source of a second component of the filling material (37,51), a channel (38) coupled to the respective sources for receiving the first and second components therefrom and in which the first and second components to cause the components to set, and a means (43) for removing residue of said components from the said channel after application of the filling material to the gap or discontinuity.

44. The apparatus of claim 43, wherein the removing means (43) comprises a piston reciprocable within the channel.

45. Apparatus for lining a pipe (1,3) having at least one gap or discontinuity (13,15) in an interior surface thereof, the apparatus comprising means for applying filling material (21) to the gap or discontinuity so that a generally smooth interior surface of the pipe is formed at the region of the gap or discontinuity, a plurality of reservoirs (36,37,49,51) in which respective components of the filling material (21) are stored, and means (53,55,57,59) for

ejecting the components from the respective reservoirs simultaneously in order to apply the filling material.

46. The apparatus of claim 45, wherein the ejecting means comprises a reciprocable piston (55) of each of said reservoirs for urging the components stored therein to be ejected in metered quantities through an outlet of each of the reservoirs for application to the gap or discontinuity.

47. The apparatus of claim 46, including means for coupling together the pistons in the respective reservoirs, a power source (53), and coupling means for applying power from the said power source to each of the pistons.

48. The apparatus of claim 47, wherein said power source comprises an air or hydraulic actuator coupled to each of the said pistons.

49. The apparatus of any one of claims 45 to 48, wherein the filling material (21) is delivered at a pressure of substantially 2000 PSI or above.

50. The apparatus of any one of claims 41 to 49 wherein the applying means comprises a cavity (75) positionable at the gap or discontinuity for receiving a supply of filling material, and means (63) associated with the said cavity for allowing the release or compression of gas or liquids trapped in said cavity as said filling material is applied to the gap or discontinuity.

51. The apparatus of claim 50 comprising a camera (63) located at said cavity (75) for providing images for locating the cavity with respect to the gap or discontinuity.